REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons which follow.

Claim Rejections -35 U.S.C. § 103

In section 5 of the Office Action, the Examiner rejected claims 1-3, 6-7, 12-14, 17-23, 26-32 under 35 U.S.C. 103(a) as being unpatentable over the combination of Wood (U.S. Patent No. 5,715,823), and Alvarez (U.S. Patent No. 6,370,413). The Examiner states:

> Referring to claim 1, Wood discloses:
>
> a. an image server (10) having a plurality of inputs and outputs (figure 1), the inputs configured to receive image information signals and the outputs configured to provide image output signals, the image server configured to store information representative of a plurality of two dimensional image slices and the output signals representative of the stored two dimensional image slices (col. 3, lines 3-29)
>
> b. an imaging device (12) having an output coupled to at least one of the inputs of the image server, and configured to provide an image signal (col. 2, line 62-col. 3, line 6)
>
> c. an image workstation (100) having an input coupled to at least one of the outputs of the image server (figure 1), and configured to receive output signals from the image server representative of selected two dimensional image slices stored by the image server (col. 3, lines 20-24), the image workstation configured to construct three dimensional image renderings from the two dimensional image slices (col. 11, line 63-col. 12, line 3. Note that the "sequence of spatially discrete images" in col. 12, line 2 is interpreted to mean image slices. Furthermore, the "physician" viewing the images is interpreted as being the user who is located at the image workstation.) and the image workstation having an output coupled to the image server (figure 1, Note that the connection between the image server and image workstation is bi-directional).

Although Wood teaches that the image workstation sends a signal to the image server (col. 11, lines 56-63), he fails to explicitly state that the signal is representative of the three dimensional rendering. However, it would have been obvious for the image workstation to send a signal representative of the three dimensional rendering to the image server, since the image server stores all relevant patient information such as ultrasound images and patient reports (col. 12, lines 64-65). Furthermore, one would be motivated to send a signal representative of the three dimensional rendering to the image server in order to allow the most appropriate specialist who is located at a another workstation access to the file for diagnosis purposes (col. 12, lines 3-5).

Wood fails to explicitly state that the image server comprises a picture archival and communications system (PACS) server, and the image workstation comprises a PACS workstation. However, PACS servers and workstations were exceedingly well known in the art. For example, Alvarez teaches a PACS server and workstation [col. 6, lines 22-29. It is noted that Alvarez's system (10) is interpreted as being analogous to a PACS server because his system "interacts" with a PACS by sending 2D images to the PACS, in order for a physician to view the image on a workstation. Furthermore, the physician viewing the image would inherently use a PACS workstation in order to view the image received by the PACS].

Wood and Alvarez are both concerned with the management of ultrasound images for constructing three dimensional renderings. Alvarez's method increases work-flow flexibility by allowing a user to reconstruct the three dimensionally rendered image without the need of resetting the viewing parameters each time it is viewed (Alvarez, col. 5, lines 33-36). Therefore, it would have been obvious to modify the image server and image workstation of Wood, so that it is a PACS server and PACS workstation, as taught by Alvarez.

Referring to claim 2, Alvarez further discloses that the PACS server stores a three dimensional rendering signal as a three dimensional rendering file (col. 5, lines 4 1-48. Note that the "viewing parameters" in line 41 is interpreted as being analogous to the three dimensional rendering signal, and the "bookmark" in lines 42-43 is interpreted to mean the three dimensional rendering file).

Referring to claim 3, Alvarez further discloses that the three dimensional rendering file may be selectively communicated to a physician using a PACS workstation (col. 6, lines 24-29).

Referring to claim 6, Wood further discloses that the imaging device (12) is a medical (ultrasound) imaging device (col. 2, lines 63-67).

Referring to claim 7, Alvarez further discloses that the PACS server includes a three dimensional rendering file storage (col. 5, lines 4 1-42 and figure 1. As noted above, the "bookmark" is interpreted to mean the three dimensional rendering file).

Referring to claim 12, Alvarez further discloses a three dimensional rendering by surface rendering (col. 5, lines 2 1-23).

Referring to claim 13, Alvarez further discloses a three dimensional rendering file (bookmark) as disclosed above, that includes the parameters needed to reconstruct the three dimensional image rendering (col. 5, lines 2 1-25).

Referring to claim 14, Wood discloses a method of producing a rendering of a three dimensional object from a plurality of two dimensional image information files, comprising:

a. receiving by an image manager (10), a plurality of two dimensional image information files from an imaging device (12) (col. 2, line 63-col. 3, line 9)

b. storing a plurality of two dimensional image files on the image manager (col. 3, lines 3-6)

c. communicating selected two dimensional image information files to an image workstation (100) (col. 3, lines 17-24 and figure 1)

d. receiving a two dimensional image information file by the image workstation (col. 3, lines 17-24).

Although Wood teaches that a three dimensional presentation is displayed at an image workstation (col. 11, line 63-col. 12, line 3), he fails to explicitly state that a three dimensional image file is constructed. However, Wood teaches that the image workstation is a computer with a monitor (col. 3, lines 30-33 and figure 1). Therefore, since it was well known for

computers to construct an image file before displaying an image (presentation) on a monitor, it would have been obvious to construct a three dimensional image file during the display of the three dimensional presentation at the image workstation.

Wood fails to explicitly disclose communicating the three dimensional image information files to the image server. However, as disclosed above, it would have been obvious to communicate the three dimensional image information file to the image server, since the image server can send or receive image information from the image workstation (col. 11, lines 59-61), and stores all relevant patient information such as ultrasound images and patient reports (col. 12, lines 64-65). Furthermore, one would be motivated to send the three dimensional image information files to the image server in order to allow the most appropriate specialist who is located at another workstation access to the file for diagnosis purposes (col. 12, lines 3-5).

Wood fails to explicitly state that the image server comprises a picture archival and communications system (PACS) server, and the image workstation comprises a PACS workstation. However, PACS servers and workstations were exceedingly well known in the art. For example, Alvarez teaches a PACS server and workstation [col. 6, lines 22-29. It is noted that Alvarez's system (10) is interpreted as being analogous to a PACS server because his system "interacts" with a PACS by sending 2D images to the PACS, in order for a physician to view the image on a workstation. Furthermore, the physician viewing the image would inherently use a PACS workstation in order to view the image received by the PACS].

Wood and Alvarez are both concerned with the management of ultrasound images for constructing three dimensional renderings. Alvarez's method increases work-flow flexibility by allowing a user to reconstruct the three dimensionally rendered image without the need of resetting the viewing parameters each time it is viewed (Alvarez, col. 5, lines 33-36). Therefore, it would have been obvious to modify the image server and image workstation of Wood, so that it is a PACS server and PACS workstation, as taught by Alvarez.

Referring to claim 17, see the rejection of at least claim 1 above.

Referring to claim 18, see the rejection of at least claim 6 above.

Referring to claim 19, Wood further discloses that the communicating step is carried out over an Ethernet connection (col. 11, line 17).

Referring to claim 20, see the rejection of at least claim 2 above.

Referring to claim 21, see the rejection of at least claim 3 above.

Referring to claim 22, see the rejection of at least claim 13 above.

Referring to claim 23, see the rejection of at least claim 2 above.

Referring to claim 26, see the rejection of at least claim 6 above.

Referring to claims 27 and 28, Alvarez further discloses that the imaging system can be based on MRI or CT modalities (col. 7, lines 63-65).

Referring to claim 29, Wood further discloses that the image workstation includes a display (element 108 in figure 1).

Referring to claim 30, see the rejection of at least claim 29 above.

Referring to claim 31, see the rejection of at least claim 3 above.

Referring to claim 32, see the rejection of at least claim 13 above.

With regard to independent claims 1, 14, and 23, neither Wood nor Alvarez, alone, or in any proper combination, discloses, teaches, suggests, or provides any motivation for an image management system in which two dimensional images that are stored on a PACS server are communicated to a PACS workstation and a 3D rendering is performed on the PACS workstation. Wood does not teach a PACS server nor a PACS workstation and accordingly, does not apply to the problems solved by the claimed invention. The

problems, at the time of Applicants' invention were that PACS workstations were not configured for 3D image rendering, and in particular using conventional 3D image rendering software. Accordingly, in conventional systems, the two dimensional images were provided to stand alone workstations through any of a variety of storage and transfer means. The stand alone workstations were set up to perform 3D image rendering. However, these stand alone workstations were not PACS workstations. Applicants appreciated the difficulty of having to interact with a separate and/or different workstation than a PACS workstation, and therefore, conceived the present invention of claims 1, 14, and 23 which include the use of a PACS workstation for rendering 3D images from a plurality of 2D images slices received from a PACS server. The 3D image rendering is then saved as a file and sent back to the PACS server. Neither Wood nor Alvarez, alone, or in any proper combination, provides the functionality recited in claims 1, 14 and 23. As stated in Applicants' background of the invention, it was typical that in conventional systems,

> doctors or users of image workstations (e.g., PACS workstations) were able to review only two dimensional image rendering of the images retrieved from the PACS. Three dimensional image rendering was restricted to three dimensional rendering on stand alone workstations dedicated for three dimensional graphics processing. Further, because of the restriction to stand alone workstations, conventional three dimensional graphics processing was not carried on PACS workstations, therefore, image information and data could not be simply received from the PACS server. Further, because 3D processing is conventionally carried out on stand alone workstations, the PACS has not been used to store 3D image information.

Page 2, line 20 – page 3, line 3. Accordingly, Applicants' invention resolves the shortcomings of the prior art which include the absence of 3D image processing on PACS workstations and the subsequent communication of 3D image rendering files back to the PACS server for storage thereon. Neither Wood nor Alvarez, alone, or in any proper combination, solves the problems foreseen by the inventors, and therefore, neither Wood

nor Alvarez provides any motivation to combine the references to solve the foreseen problems.

Accordingly, claims 1, 14, 23, and their respective dependent claims, are not obvious under 35 U.S.C. § 103 over Wood in view of Alvarez, therefore, claims 1, 14, 23, and their respective dependent claims, are allowable.

Claims 1-3, 6-14, 17-23, and 26-32 are now pending in this application.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

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